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RELATIONSHIP BETWEEN WEIGHT AND GLUCOSE USING MATH-PHYSICAL MEDICINE

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Background & Aim: This paper investigates the relationship between weight and glucose based on 9,855 data covering three years or 1,095 days (9/4/2015-9/3/ 2018) of one type 2 diabetes (T2D) patient's data.

Method: Health conditions comparison (2012 vs. 2018): weight: 210 lbs. vs. 170 lbs. BMI: 31 vs. 24.7 daily postprandial glucose (PPG): 280 mg/dL vs. 115 mg/dL A1C: 10.0% vs. 6.5%. This diabetes research project of eight years and 20,000 hours combined utilized advanced mathematics, finite element modeling, signal processing, optical physics, big data analytics, statistics, and artificial intelligence.

Results: Among the five fasting plasma glucose's (FPG) influential factors, weight is the most dominant one, contributing ~85%. Weight and FPG have a high correlation of 68% -82%. In spatial analysis, 94% of the total collected data is covered by a +/- 20% band around a skewed line. This relationship band stretched from point A (24.6, 100) to point B (26.6, 140) on a map with coordinates of x=BMI and y=glucose. However, among the PPG's 19 influential factors, weight is not the dominating factor. Instead, the combined effect of carbs/sugar intake and post-meal exercise contributes 79% of PPG formation. Weather temperature counts for ~10% and the other factors impact 11%. Weight and PPG have a low correlation (between 3% and 36%). In spatial analysis, 95% of the total collected data covers by a +/- 20% band centering around a horizontal PPG line of 118 mg/dL.

Conclusion: The results show that 94% of FPG data are directly related to weight according to a fixed slope. However, 95% of PPG data are kept within a horizontal range from 94 mg/dL to 142 mg/dL due to carbs/sugar intake and post-meal exercise, but not by weight.

BIOGRAPHY

Gerald C Hsu has received an honorary PhD in Mathematics and majored in engineering at MIT. He attended different universities over 17 years and studied seven academic disciplines. He has spent 20,000 hours in T2D research. First, he studied six metabolic diseases and food nutrition during 2010-2013, then conducted research during 2014-2018.

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